Abstract

Research on learners' mathematical identities has become increasingly prominent over the last two decades. Despite this interest, various reviews of research on learners' mathematical identities argue that there is a need for the concept of identity to be more clearly defined and conceptualised in theoretically coherent ways that contribute to the concept being empirically accessible. I propose the use of critical realism as a theoretical framework, which has not been used before in this field, to define and research learners' mathematical identities as they are constructed in classrooms, in a non-reductionist manner. Mathematical identity is defined as a social phenomenon, existing in the real world, which emerges from relationships between learner agency, personal identity and social identity, both offered and constructed, but are not reduced to any of these three mechanisms.

Building on the theoretical framework, two explanatory frameworks are developed to support the application of the theoretical framework to data. The first explanatory framework relates teachers' practices with learners' mathematical identities, and the second explanatory framework relates peer interactions with learners' mathematical identities. Most of this study focuses on the first explanatory framework to further our understandings of how learners and teachers contribute to the development of learners' mathematical identities. A small part of the study shows how the second explanatory framework can be used to understand how and why learners construct certain identities in peer interactions.

The methodological approach of this study is a qualitative research approach. Data for this study were collected over two years in a technical high school in Johannesburg over two years in the third school term in both years (August - September), for two weeks in 2015 (Grade 9) and four weeks in 2016 (Grade 10). In total, nineteen learners participated in the study over both years, eight in the first year, with an additional eleven in the second year, along with their five mathematics teachers, two in the first year and three in the second year. Data were collected in the form of videotaped lessons, field notes, photographed learner notebooks and audiotaped interviews with participants.

Using the first explanatory framework, my analysis of the data points to several important findings, which are: the teachers' narratives and actual practices, which incorporate teachers' pedagogical approaches and social relationships with learners are related, and jointly influence the social identities offered to learners; the social identities offered by the teachers, which were informed by how the teachers spoke about errors, the learners and learner

thinking, strongly informed, but did not determine the mathematical identities constructed by learners as learners also played a role in the construction of their mathematical identities; learners were more willing to construct social identities of affiliation with their classroom communities when they felt that their teachers cared about them and others in the classroom; and that learners' mathematical identities changed, some negligibly and other substantially, over the two-year period in response to changes in teachers. It is recommended that teachers remain conscious of the kinds of opportunities they present to learners to learn mathematics, the kinds of narratives they tell about learners and the types of pedagogical approaches they utilise in the classroom, as these narratives and teacher practices inform the kind of opportunities that teachers provide learners to learn mathematics.